INTERSERVICE RADIO PROPAGATION LABORATORY
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Maximum-Usable-Frequency Graph Paper

The I.R.P.L. finds the coordinate paper, of which sample is attached, useful in plotting and interpolating values of m.u.f. and skip distance. It is presented here with the thought it may be useful to others. With it may be determined maximum usable frequencies, m.u.f. factors, or skip distances, for all ranges of frequencies and distances, from a limited number of observations, such as those reported daily by the I.R.P.L.

The scale of abscissas has been adjusted so that the average curve of variation of the F- or F_2-layer m.u.f. factor with distance is a straight line. Actual curves will in general not be straight lines, but smooth curves which do not depart very far from a straight line. The scale of ordinates is linear and may be used for plotting either m.u.f. or m.u.f. factors. On request, the I.R.P.L. will be glad to furnish a stock of the coordinate paper.

1. To determine directly m.u.f. or skip distances.

(a) Plot the available data as points on the sheet. These data will usually be furnished as F- or F_2-layer m.u.f. for distances of 0, 1000 miles, and 2500 miles.

(b) Draw a smooth curve through the points, lightly.

(c) If an E-layer critical frequency is furnished also, multiply this by the appropriate factor for Table I below for the distances shown, and plot this curve also, lightly.

(d) Draw in ink or heavy pencil the portions of each curve representing the highest m.u.f. for all distances. This is then the m.u.f.-distance curve, or the frequency-skip distance curve. Frequencies and distances below the curve represent sky-wave transmission via the regular layers; points above the curve represent skipping. Furthermore, points which lie below both F- and E-layer curves represent possible transmission by the two layers simultaneously.

2. To determine F- or F_2-layer m.u.f. factors.

(a) Plot the available m.u.f. factor data as points on the sheet. These will usually be furnished as factors for 0, 1000 miles and 2500 miles.

(b) Draw a smooth curve through the points. This is the F-layer factor curve.

(over)

3. To determine m.u.f. and skip distance from given m.u.f. data which do not specify the layer.

(a) Plot all available m.u.f. data as points on the sheet. These will usually be furnished as m.u.f. for 0, 500, 1000, 1500, 2000, and 2500 miles.

(b) Determine skip distances or m.u.f. for other distances by linear interpolation between the points given.

Table I. E-layer Factors

Distance in miles	Factor	Distance in miles	Factor
200	1.49	1400	4.81
400	2.43	1800	4.86
600	3.24	2200	4.73
1000	4.50	2500	4.27

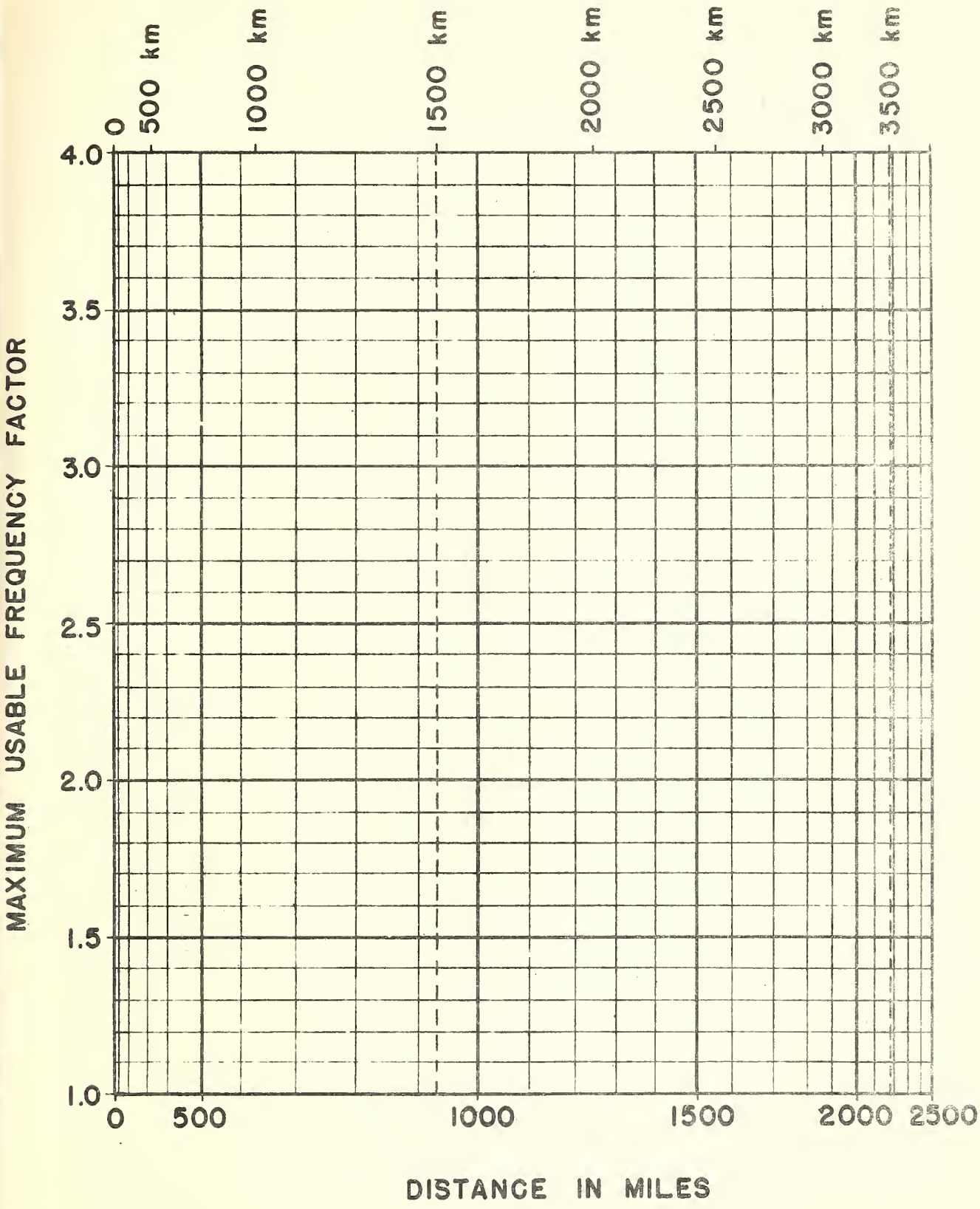

Fig 29. Graph paper for rapid determination of maximum usable frequency factor for transmission distances up to 2500 miles. (Distances indicated in miles and kilometers).